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SECTION IV.—RIVERS AND FLOODS.

RIVERS AND FLOODS DURING JUNE, 1917.

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[Dated: River and Flood Division, July 26, 1917.]

The rainfall of June was very irregularly distributed, as may be seen by inspection of Chart V of this REVIEW. So-called islands of maximum rainfall—a monthly total of 10 inches or more—appear in southwestern Maine, eastern North Carolina, southern Iowa, and southeastern Nebraska. Surrounding these islands of maximum rainfall and extending some distance therefrom, as shown by the chart, are regions of lesser rainfall—8 inches or over.

The character of the rainfall distribution resulted in moderate local floods in various parts of the country. Many of these floods caused little damage, but, on the other hand, many others, as will be shown later, overflowed bottom lands, planted largely to corn, and caused a very considerable loss, measured in the outlay for seed and the labor in preparing and cultivating the ground. In many cases the water quickly ran off the lowlands, and farmers were able to replant these lands to an early maturing variety of corn, hence a total loss of the crop is not probable.

FLOODS IN NEW ENGLAND AND NEW YORK.

Floods in the Mohawk, Oriskany, and Sanquoit Valleys of New York on June 11 caused heavy loss to mills, the destruction of dams, highways, and crops. Farther east, as in the Hudson, the flood was not so severe.

Two flood periods occurred in the rivers of New England, the first on the 12th and the second on the 19th. The last named was specially damaging to lowland crops on the upper reaches of the river. Along the Androscoggin and upper Connecticut the loss to crops is estimated at \$300,000.

FLOODS IN THE MIDDLE MISSISSIPPI, LOWER MISSOURI, AND LOWER OHIO VALLEYS.

Very heavy rains on the morning of June 5 caused a sharp rise in the lower Des Moines River, and this in turn caused a rise of 6.5 feet in the Mississippi at Keokuk, Iowa, due to backwater from the Des Moines which empties into the Mississippi a few miles below Keokuk. The initial flood wave in the Mississippi thus produced was augmented by a second period of heavy rains beginning on the 9th. The rains of this period extended eastward to Indiana, and were effective in causing flood stages in the streams of Iowa, Missouri, Illinois, and Indiana. The floods in the smaller streams converged in the Mississippi, with the result that that river was in flood from Keokuk, Iowa, southward to New Madrid, Mo., a distance of nearly 500 miles. Practically all the lowlands in this stretch not protected by levees were overflowed, although the construction of temporary levees in the neighborhood of Cape Girardeau, Mo., was effective in protecting a considerable acreage in that vicinity. The flood-warning service contributed materially to the protective measures that were adopted.

In Indiana both the lower Wabash and the lower White Rivers overflowed into the lowlands and injured the crop prospects in those regions.

The Missouri River from about St. Joseph, Mo., to the mouth of the stream came under the influence of the rains above mentioned, and was in flood generally throughout the stretch mentioned. Fortunately the Kansas River contributed but little flood flow.

FLOOD IN THE COLORADO RIVER.

The cold Spring of 1917 retarded melting of the accumulated snowfall on the elevated portions of the watershed in Colorado, Utah, and Wyoming. Warm weather in June caused a rapid melting of the snow and rapidly rising rivers, especially the Grand, the Gunnison, and the Green. The crest of the Colorado flood passed Yuma, Ariz., on July 1, 1917, at a stage of 29.5 feet. An account of the annual rise in the Columbia will appear in a later issue of the MONTHLY WEATHER REVIEW.

"The Engineering News-Record" of July 5, 1917, contains a brief account of the bursting of the dam which formed the Mammoth reservoir of the Price River Irrigating Co., 6 miles west of Scofield, Utah. The released water formed a maximum flood crest estimated at 20 feet in height, which destroyed approximately 30 miles of railway track, including 10 steel bridges, entailing a loss of about \$2,000,000.

An attempt has been made to ascertain the extent of the overflowed lands along the various streams that were in flood during the month. The results appear in the table below.

Bottom lands overflowed during June, 1917.

River and district.		Over- flowed.	Remarks.
Name.	State.		
		Acres.	
Mississippi.....	(Missouri..... Arkansas..... Tennessee..... Mississippi.....)	1,706,840	From backwater on both banks of river, including land between levees. Opposite Needles, Cal.
Colorado.....	Arizona.....	400	
White.....	Indiana.....	*150,000	Reported from Binghamton.
Wabash.....	do.....	*150,000	
Susquehanna.....	New York.....	250	
Missouri.....	(Kansas..... Missouri.....)	39,470	
Fabius.....	do.....	*15,000	
Little Arkansas.....	Kansas.....	650	
Des Moines.....	Iowa.....	*5,600	
Total.....		2,068,210	

* Estimated.

Property loss by flood (mostly estimated) in June, 1917.

River.	Tangible property, bridges, etc.	Crops.		Live stock.	Value of warning.
		In hand.	Prospective.		
Mohawk.....	\$2,000		\$5,000	(?)	\$8,000
Androscoggin.....	50,000		250,000		
Connecticut.....					
Susquehanna.....	3,500		11,825		
Colorado.....	5,000	\$1,000		\$1,000	20,000
Lower Mississippi (Vicksburg).....	5,000	5,000	30,000	3,000	300,000
Lower White.....			100,000		
Lower Wabash.....			Heavy.		
Middle Mississippi:					
Hannibal, Mo.....	328,000		241,000	600	15,000
Cairo, Ill.....			* 177,000		100,000
Missouri:					
Kansas City, Mo.....	83,200		778,250		229,750
Price River, Utah.....	2,000,000				
Total losses.....	2,456,700	9,000	1,502,875	4,600	672,750

1 Loss in March, April, and May not previously reported.

2 Total loss from all circumstances.

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

TABLE 1.—Floods in North Atlantic drainage during June, 1917.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Connecticut.....	White River Junction, Vt.	Feet. 13	13	15	Feet. 14.4	13
Do.....	do.....	13	19	20	14.7	19
Hudson.....	Troy, N. Y.	15	12	13	23.3	12
Do.....	Albany, N. Y.	12	13	13	12.5	13
Mohawk.....	Tribes Hill, N. Y.	16			15.0	12
Do.....	Utica, N. Y.	11	11	12	12.0	11
Delaware, East Branch.	Fishes Eddy, N. Y.	10			9.9	11
Susquehanna.....	Oneonta, N. Y.	12	12	12	12.3	12
Chenango.....	Sherbourne, N. Y.	8	12	13	9.1	12

TABLE 2.—Floods in South Atlantic drainage during June, 1917.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Roanoke.....	Weldon, N. C.	Feet. 30	12	12	30.3	12
Neuse.....	Smithfield, N. C.	13	16	16	13.2	16
Santee.....	Rimini, S. C.	12			11.5	16
Do.....	Ferguson, S. C.	12			11.7	16

TABLE 3.—Floods in Ohio River and tributaries during June, 1917.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Ohio.....	Evansville, Ind.	Feet. 35			33.2	4
Do.....	Mount Vernon, Ind.	35			32.2	5
Do.....	Shawneetown, Ill.	35			33.7	10
Do.....	Cairo, Ill.	45			44.6	16, 17
Kiskiminetas.....	Saltsburg, Pa.	8	7	7	8.5	7
Shenango.....	Sharon, Pa.	9			8.6	10
Scioto.....	Circleville, Ohio	7	30	30	8.3	30
Wabash.....	Terre Haute, Ind.	16			15.5	11
Do.....	Vincennes, Ind.	14	7	16	16.0	9
Do.....	Mount Carmel, Ill.	15	2	19	22.6	12
White.....	Decker, Ind.	18	1	18	22.8	12
White, East Fork.....	Shoals, Ind.	20	9	12	23.0	10
White, West Fork.....	Elliston, Ind.	19	6	15	27.0	8

TABLE 4.—Floods in the Mississippi River and tributaries during June, 1917.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Mississippi.....	Keokuk, Iowa	Feet. 14	5	5	14.7	5
Do.....	do.....	14	14	19	15.0	17
Do.....	Warsaw, Ill.	17	5	5	18.2	5, 14
Do.....	do.....	17	13	18	18.1	15, 17
Do.....	Quincy, Ill.	14	6	21	17.1	17
Do.....	Hannibal, Mo.	13	5	23	18.1	9
Do.....	Louisiana, Mo.	12	6	22	18.2	10
Do.....	Crafton, Ill.	18	8	24	22.9	14
Do.....	St. Louis, Mo.	30	11	18	32.9	14
Do.....	Chester, Ill.	27	12	21	30.7	15, 16
Do.....	Cape Girardeau, Mo.	30	11	22	34.2	16
Do.....	New Madrid, Mo.	34	13	22	35.5	17, 18
Do.....	Memphis, Tenn.	35			34.6	21, 22
Do.....	Helena, Ark.	42	19	27	43.5	24
Do.....	Arkansas City, Ark.	42	15	(*)	46.6	27, 28
Do.....	Vicksburg, Miss.	45			43.7	30
Eastern tributaries.						
Illinois.....	Morris, Ill.	13		10	13.3	10
Do.....	Perru, Ill.	14	10	23	16.8	15
Do.....	Peoria, Ill.	16	7	25	18.3	15
Do.....	Havana, Ill.	14	12	30	17.1	17
Do.....	Beardstown, Ill.	12	10	(*)	19.1	17
Do.....	Pearl, Ill.	12	6	(*)	18.2	15-17
Western tributaries.						
Des Moines.....	Des Moines, Iowa	17			16.2	10
Do.....	Ottumwa, Iowa	10	5	17	16.5	11
Little Arkansas.....	Sedgewick, Kans.	18	2	2	17.4	2
Neosho.....	Neosho Rapids, Kans.	22			20.0	5
Petit Jean.....	Danville, Ark.	20	4	5	21.2	4
White.....	Georgetown, Ark.	22			20.9	14-16
Black.....	Black Rock, Ark.	14	9	13	19.7	10
Cache.....	Jelks, Ark.	9			8.6	21-25

* Continued into July, 1917.

TABLE 5.—Floods in Missouri River and tributaries during June, 1917.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Missouri.....	Running Water, S. Dak.	Feet. 16			15.2	28
Do.....	Blair, Nebr.	15			14.6	30
Do.....	St. Joseph, Mo.	12	6	13	13.7	10
Do.....	Kansas City, Mo.	22	3	16	26.7	9
Do.....	Waverly, Mo.	23	8	13	24.6	10
Do.....	Boonville, Mo.	21	9	15	23.9	11
Do.....	Hermann, Mo.	21	9	16	24.8	12
Republican.....	Clay Center, Kans.	18			17.2	6
Blue.....	Blue Rapids, Kans.	21			20.8	6
Grand.....	Brunswick, Mo.	10	(†)	19	19.4	10
Do.....	do.....	10	29	(*)	11.3	30
Do.....	Chillicothe, Mo.	18	4	14	31.5	8
Do.....	do.....	18	29	29	18.0	29

* Continued into July, 1917.

† Continued from preceding month.

TABLE 6.—Floods in West Gulf and Pacific drainage, June, 1917.

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Rio Grande.....	San Marcial, N. Mex.	Feet. 11	(†)	(*)	14.5	{ 16, 20, 21
Colorado.....	Topock, Ariz.	14	12	(*)	23.3	24
Do.....	Parker, Ariz.	10	23	24	10.1	23, 24
Grand.....	State Bridge, Colo.	9	16	28	10.2	20
Do.....	Grand Junction, Colo.	11	16	26	13.0	18
Do.....	Fruita, Colo.	10			15.0	20
Roaring Fork.....	Carbondale, Colo.	6	16	(*)	6.6	18, 19
Eagle.....	Eagle, Colo.	5	15	28	6.1	18, 19
Gunnison.....	Sapinero, Colo.	16	10	(*)	19.7	19
Do.....	Delta, Colo.	9	10	25	9.9	16-18
North Fork of Gunnison	Paonia, Colo.	8	3	30	9.1	13-17
Green.....	Green River, Wyo.	9	19	(*)	11.4	28, 29
Do.....	Elgin, Utah	13	14	(*)	17.5	27
San Joaquin.....	Firebaugh, Cal.	12			11.5	21-23
Do.....	Lathrop, Cal.	17	13	13	17.0	13
Kings.....	Piedra, Cal.	12	8	10	12.6	9, 10
Do.....	do.....	12	14	20	12.5	18
Columbia.....	Marcus, Wash.	24	(†)	(*)	30.0	23-25
Do.....	Wenatchee, Wash.	40	18	29	40.4	{ 20, 21, 24
Do.....	Umatilla, Oreg.	25			23.7	19
Do.....	The Dalles, Oreg.	40	20	21	40.4	20
Do.....	Vancouver, Wash.	15	(†)	(*)	24.5	22
Kootenai.....	Bonners Ferry, Idaho.	26	19	19	26.0	19
Pend Oreille.....	Newport, Wash.	16	(†)	(*)	21.6	25-27
Clearwater.....	Kamiah, Idaho.	14	16	21	15.4	17
Willamette.....	Portland, Oreg.	15	(†)	(*)	23.8	22

* Continued into July, 1917.

† Continued from preceding month.

MEAN LAKE LEVELS DURING JUNE, 1917.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., July 5, 1917.]

The following data are reported in the Notice to Mariners of the above date:

Data.	Lakes.*			
	Superior.	Michigan and Huron.	Erie.	Ontario.
	Feet.	Feet.	Feet.	Feet.
Mean level during June, 1917:				
Above mean seal level at New York.....	602.60	581.53	573.53	246.98
Above or below—				
Mean stage of May, 1917.....	+0.23	+0.39	+0.60	+0.47
Mean stage of June, 1916.....	-0.83	+0.55	+0.25	+0.88
Average stage for June, last 10 years.....	+0.34	+0.76	+0.61	-0.06
Highest recorded June stage.....	-0.83	-2.07	-0.99	-1.65
Lowest recorded June stage.....	+1.36	+1.63	+1.96	+2.09
Average relation of the June level to—				
May level.....	+0.4	+0.3	+0.1	+0.2
July level.....	-0.2	-0.1	+0.1	+0.1

* Lake St. Clair's level: In June, 576.31 feet.